(12) UK Patent Application (19) GB (11) 2 276 444 (13) A

(43) Date of A Publication 28.09.1994

(21) Application No 9403912.0

(22) Date of Filing 01.03.1994

(30) Priority Data
(31) 9304199 (32) 02.03.1993 (33) GB

(51) INT CL[5]
F24C 15/06

(52) UK CL (Edition M)
F4W W57

(56) Documents Cited
None

(58) Field of Search
UK CL (Edition M) F4W
INT CL[5] F24C 15/06
ONLINE DATABASE:WPI

(71) Applicant(s)
Unidare Environmental Limited

(Incorporated in Ireland)

Unidare Works, Seagoe, PORTADOWN, County Armagh, BT63 5HU, United Kingdom

(72) Inventor(s)
Alan McDonald
Nicholas Beckett

(74) Agent and/or Address for Service
Eric Potter Clarkson
St Mary's Court, St Mary's Gate, NOTTINGHAM, NG1 1LE, United Kingdom

(54) Simulated flame effect fire

(57) A random flame effect is produced by using an illumination source (7), a primary directive reflector (6), a fixed coloured filter glass (5) through which the light is passed to a first reflector (4) and then to a second reflector (3) before being perceived as the flame effect on a viewing screen (1) by the user. The viewing screen may include a diffuser (2). The reflector (4) is rotatable. The reflector (3) is shaped to simulate flames. Imitation fuel elements (8) may be located at the front of the fire.

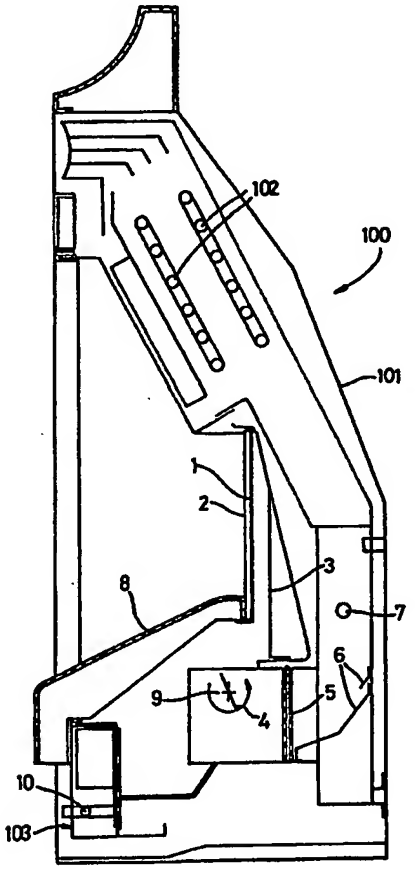

Fig. 1

GB 2 276 444 A

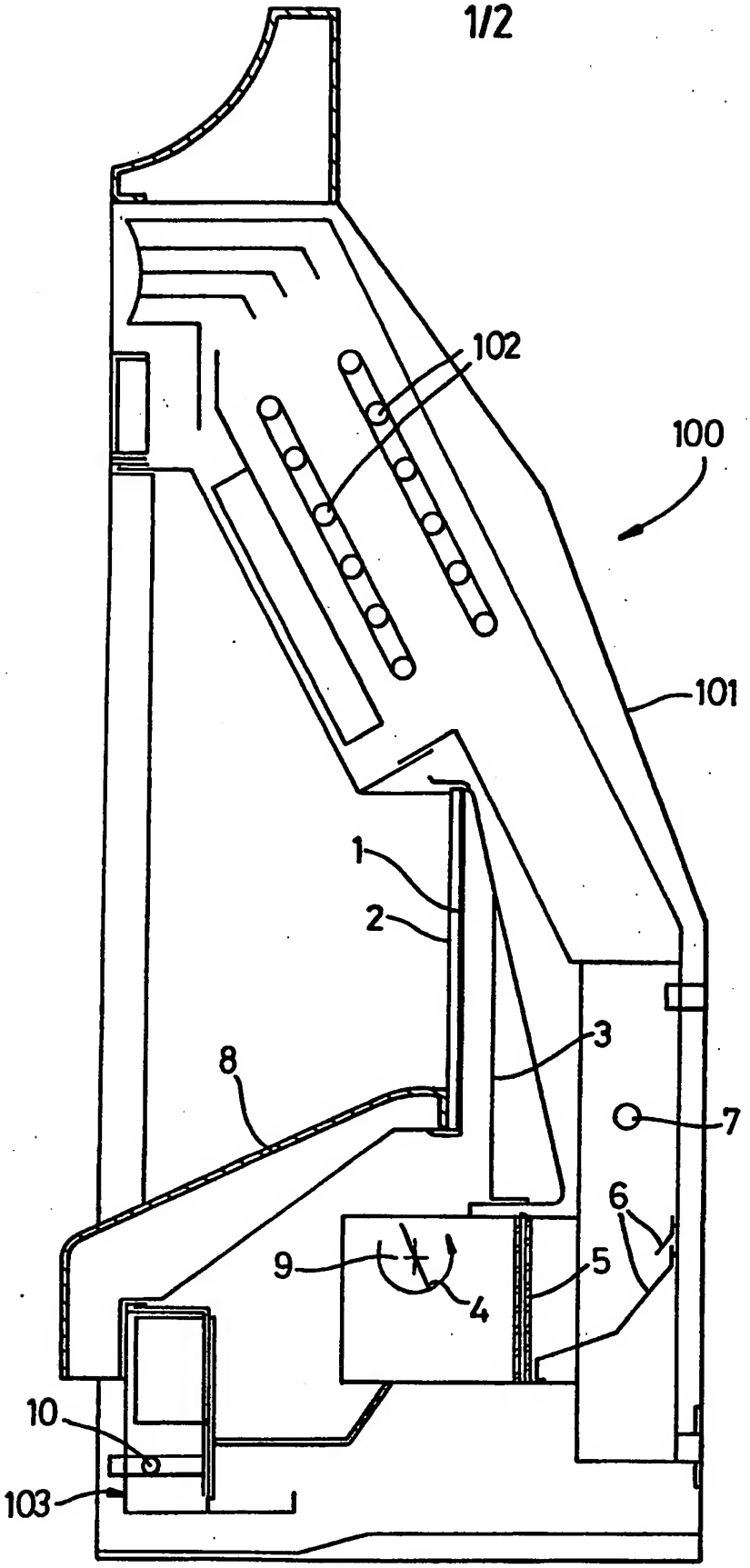

Fig. 1

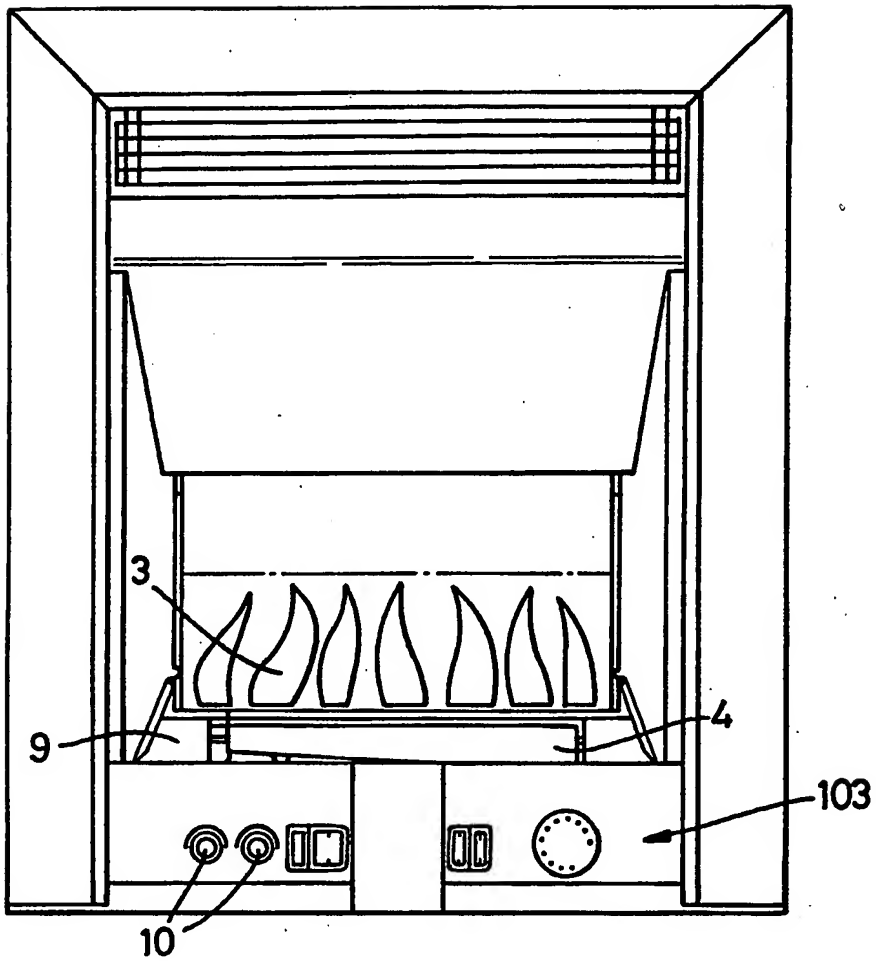
3
9
4
103
10

Fig. 2

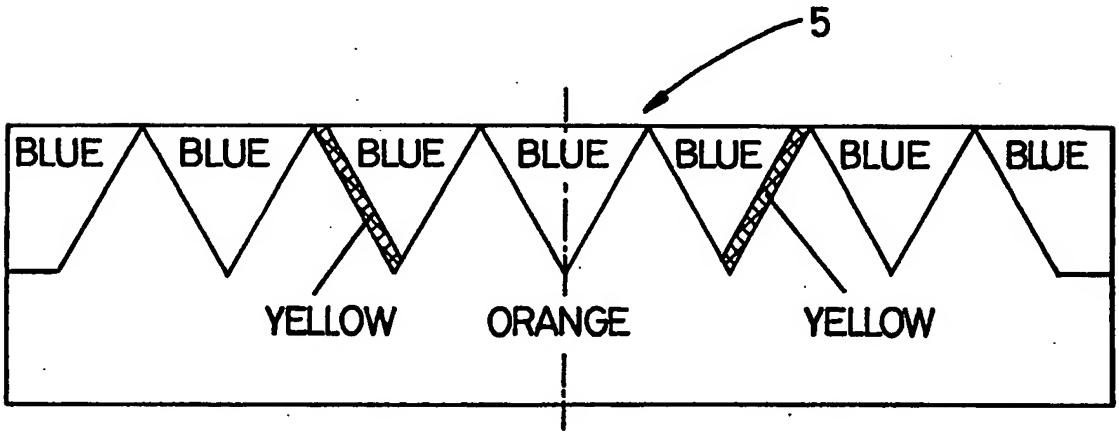
5
BLUE
BLUE
BLUE
BLUE
BLUE
BLUE
BLUE
YELLOW
ORANGE
YELLOW

Fig. 3

2276444

SIMULATED FLAME EFFECT FIRE

The present invention relates to a simulated flame effect fire and more particularly to apparatus for producing a realistic flame effect.

Many attempts have been made to simulate flame or burning fuel effects. However, a problem which exists with prior art apparatus is that they are detectably repetitive over relatively short time periods, even though the effect itself may be considered elaborate. In consequence the effect can be perceived to be less 'realistic' over time.

The present invention seeks to provide a simulated flame effect fire and apparatus which provides a complex effect such that the perception of repetition is somewhat confused by multiple events and subtle change, thereby improving the apparent 'random' quality to such an extent as to better synthesise 'realism'.

According to the present invention there is provided an apparatus for producing a simulated flame effect including an illumination source, a primary directive illumination reflector, a fixed coloured filter glass through which light is passed to a first reflection means and then to a second reflection means before being perceived as the effect on a viewing screen.

Preferably the coloured filter glass provides a plurality of colours.

An alternative would allow for further illumination sources providing for alternative or additional directionality and or further colour variation.

In a preferred embodiment the illumination source is a tungsten

halogen filament lamp.

In an alternative embodiment illumination sources may be plural and of a variety of common types as may be considered suitable for the purpose. Such light emitters may be self coloured or utilise complex filters for the generation of effect and colour.

The light sources may be adjustable in light intensity. Such adjustment may be controllable by manual or automatic means. Automatic adjustment may be controllable by a sequence timer or by dedicated electronic means.

In a specific embodiment the light source is partially enclosed such that light may be allowed to radiate in desired directions only. Emissions are first reflected and thereby directed through a coloured filter glass. The combination of the colour arrangement on the filter and the direction of the reflected light through the filter gives a 'blend' of colour and direction as may be deemed suitable or desirable for the effect.

In all of the above embodiments the coloured light is preferably directed onto a rotating reflector which, through a portion of its area will reflect light onto a shaped reflector. The direction of light onto the rotating reflector is such that its direct path falls onto the rear of the translucent fuel simulation means. The light falling onto the rear of the fuel simulation means is interrupted and disturbed by the rotating reflector and thereby creates a dynamic effect within the simulated fuel.

The light reflected onto the shaped reflector is in turn reflected onto the rear of the effect viewing screen. The effect as viewed is therefore a composite created by the various light paths, colours and angles from

source to screen.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a schematic cross-section, in side view, of a room heater incorporating a flame effect in accordance with the present invention;

Figure 2 shows a schematic front elevation of the heater in Figure 1 with the diffuser, screen and imitation fuel element removed; and

Figure 3 gives the detail of an embodiment of the colour filter glass.

With reference to the drawings, the heater 100 comprises a heater casing 101, preferably constructed of sheet metal, within which are mounted by suitable means, electric heating elements 102. For the purpose of this invention, the use of alternative heating means is not precluded. Such means are well known and will thus not be described further.

The main elements of the flame effect simulation apparatus will now be described.

Viewing Screen 1 and Diffuser 2

The function of these elements is to catch and diffuse the incident light from the shaped reflector 3 in order to reveal the effect as viewed from the front of the heater 100.

The screen 1 and diffuser 2 may be :

a) separate elements, comprising a lamina diffusing sheet held

or fixed behind a panel of plain or tinted glass.

b) a single panel of plain or tinted glass, itself coated with a diffusing medium on one or both faces,

c) a hybrid material panel designed for diffusion and or the enhancement of projected light.

In a preferred embodiment a grey tinted acrylic material 3mm thick coated on one face with a specially designed anti-glare coating may be used.

Shaped Reflector 3

The shaped reflector 3 comprises a series of reflective elements of a form and profile to enhance the desired effect. Alternative means are:-

a) a series of independent reflective shapes that may be individually formed in depth and profile and mounted on a plurality of planes.

b) a lamina reflective surface, or surfaces, selectively coated with a non reflective medium such that reflective shapes remain in relief.

In a preferred embodiment a reflective chrome plated or stainless steel sheet is screen printed using a black ink leaving what could be termed as 'flame shapes' in relief.

The shaped reflector 3 receives light from the rotating reflector 4. The reflective 'shaped' areas direct light onto the rear of the screen 1.

Rotating Reflector 4

This component reflects or interrupts light incident upon it from the colour filter glass 5. By means of its rotation the dynamics of the effect

are created. As shown in figure 1 the direction of rotation is counter-clockwise.

During its motion, light from the source 7, via the colour filter glass, is reflected onto the shaped reflector 3. Equally the rotation interrupts light on its path to the underside of the imitation fuel element 8 giving rise to a dynamic effect within the said element.

In a preferred embodiment the rotating reflector 4 has been developed for the provision of a satisfactory effect and ease of production. The material used for the component body is reflective on both of its faces. Chrome plated steel or stainless steel are examples of suitable materials. The strip of material is sequentially slit and rotated in order to create a helical progression of reflective surfaces along its length, held together by a central spine of unslit material. The helix is such that two full turns have been imposed over its length. To further add to the effect the rotation spigots are spot welded on either end of the formed helix at diagonal extremes. The resultant eccentric rotation is considered to add greatly to the quality of the effect.

In an alternative embodiment the rotating reflector may be made up as an assembly using separate reflective elements or 'cusps' mounted along the length of a central spindle by various means.

In both embodiments an option that may be employed to improve the random quality of the effect is to disturb or interrupt the regularity of reflection along the length of the helical arrangement by irregular removal of reflective surfaces by physical removal of material or by 'blacking out' using ink or paint.

Colour Filter Glass 5

All of the light incident on the rotating reflector 4 and on the underside of the imitation fuel element 8 passes through the colour filter glass 5 which provides the desired plurality and mix of colours required.

In a preferred embodiment the glass 5 is screen printed on one face with translucent epoxy based coloured inks. An example of the designation of the coloured areas using Orange, Blue and Yellow is as shown in Figure 3.

In an alternative embodiment a plurality of individually coloured sources may be used positioned within the body of the heater case 101, as may suit the desired effect.

Source Reflector 6

The purpose of the source reflector 6 is twofold. One function is to allow the lamp source to be placed in a physical position which suits the specific requirements as may be preferred. For example, the active lamp may produce heat such that it requires to be physically distanced from the other effect components and suitably cooled. Another function of the source reflector 6 is to provide light paths of a specific directionality as may suit the arrangement of the colour filter glass 5, the rotating reflector 4 and the imitation fuel element 8.

Light Source 7

The light source 7 is of a type as is most suitable for the specific requirement and is placed within the heater casing 101 as suits the purpose of the effect. The intensity of the light output may be varied either manually or automatically by electronic means.

In a preferred embodiment the source 7 is of a Tungsten Halogen type, for example, placed in a partially enclosed environment such that light output is constrained while the lamp is able to be cooled by an airflow contrived to supply the heating elements 102 mounted above. The light output intensity is controlled by electronic means, between full brilliance and a minimum level as preset on the controller. The control is via a potentiometer which is made available on the control face 103 of the heater 100.

In an alternative embodiment a variety of illumination devices may be employed, such as fluorescent, cold cathode and filament bulbs, for example. Such sources may be positioned to achieve maximum performance or effect.

Imitation Fuel Element 8

The imitation fuel element 8 appears as 'hot' when illuminated from behind or below as may be applicable. This element is designed to imitate or represent a bed of fuel, in colour and appearance, which may take the form of various types of coal, coke or wood for example.

As drawn in Figure 1, the element is a single unit placed in front of the viewing screen 1. It may however, comprise more than one part and may also appear behind the viewing screen 1.

Fuel elements may be manufactured from any material deemed suitable, not precluding the genuine material being represented, coal, coke or wood for example. It may also be manufactured from cast ceramic, injection moulded plastic or resin bonded composite.

In a preferred embodiment the element is an amber tinted glass

fibre/resin composite moulding with surface painted detail.

Rotational Motor Drive 9

The rotational motor drive 9 rotates the rotating reflector 4 in an anti-clockwise direction as viewed in Figure 1.

The motor may be of a variety of types such as, synchronous AC, DC, or DC stepper, for example, driving direct or via a gearbox as may be required. The motor may be selected to produce variable speed, DC or DC stepper, or fixed rate synchronous AC.

In a preferred embodiment a DC stepper motor and gearbox assembly is controlled electronically to deliver between 8 and 15 revs per minute, selected on the controller by a potentiometer. This control being made available on the control face 103 of the heater 100.

In an alternative embodiment the same effect may be driven at a fixed rate using an AC synchronous motor thereby allowing for cost saving against the absent controller.

Effect Control 10

The effect and or heat output of the heater can be controlled manually or automatically as may be preferred.

The potential for control is wide ranging from simple switches to turn on and effect or heating element up to the use of digital microprocessing to orchestrate all variable detail of the effect or heat output in 'real time'. Such features may include timed programming or temperature control of the heat output, fault detection or a real fire sound effect.

Manual controls may be placed in any position deemed safe and suitable.

In a preferred embodiment manual control is provided over the lamp brightness and the effect speed as outlined above. Both controls, via potentiometers, are made available on the control face 103 of the heater 100.

Overview of the Invention

In summation, all of the effect components are contrived and developed to produce an effect intended to be perceived by the viewer as pseudo-random in nature, claimed thereby to improve the impression of realism. This is achieved by the diverse variation of activity and colour giving rise to a confusion of the visual sense sufficient to cause doubt over exact repetition of events in 'real time'.

Furthermore, the invention provides independent speed and brightness control over the effect parameters.

CLAIMS

1. Apparatus for producing a simulated flame effect including an illumination source, a primary directive illumination reflector, a fixed coloured filter glass through which light is passed to a first reflection means and then to a second reflection means before being perceived as the effect on a viewing screen.

2. Apparatus as claimed in claim 1 in which the coloured filter glass provides a plurality of colours.

3. Apparatus as claimed in claim 1 or claim 2 including further illumination sources providing for alternative or additional directionality and or further colour variation.

4. Apparatus as claimed in claims 1, 2 or 3 in which illumination source is a tungsten halogen filament lamp.

5. Apparatus as claimed in claim 2 in which the plural illumination sources are of a variety of common types suitable for the purpose which may be self coloured or utilise complex filters for the generation of effect and colour.

6. Apparatus as claimed in anyone of claims 1 to 5 in which the light sources are adjustable in light intensity.

7. Apparatus as claimed in claim 6 in which the adjustment is controllable by manual or automatic means.

8. Apparatus as claimed in claim 7 in which the automatic adjustment

is controllable by a sequence timer or by dedicated electronic means.

9. Apparatus as claimed in any one of claims 1 to 8 in which the light source(s) is/are partially enclosed such that light is allowed to radiate in desired directions only.

10. Apparatus as claimed in any one of claims 1 to 9 in which the light emissions are first reflected and thereby directed through a coloured filter glass, the combination of the colour arrangement on the filter and the direction of the reflected light through the filter giving a 'blend' of colour and direction as may be deemed suitable or desirable for the effect.

11. Apparatus as claimed in any one of claims 1 to 10 in which the coloured light is directed onto a rotating reflector which, through a portion of its arce will reflect light onto a shaped reflector, the direction of light onto the rotating reflector being such that its direct path falls onto the rear of the translucent fuel simulation means. The light falling onto the rear of the fuel simulation means is interrupted and disturbed by the rotating reflector thereby creating a dynamic effect within the simulated fuel.

12. Apparatus as claimed in claim 11 in which the light reflected onto the shaped reflector is in turn reflected onto the rear of the effect viewing screen, the effect as viewed being therefore a composite created by the various light paths, colours and angles from source to screen.

13. Apparatus for producing a simulated fuel effect substantially as described with reference to the accompanying drawings.

14. An electric fire incorporating apparatus for producing a simulated fuel effect as claimed in any one of claims 1 to 12.

15. An electric fire substantially as described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report) - 13 -	Application number GB 9403912.0
Relevant Technical Fields (i) UK Cl (Ed.M) F4W (ii) Int Cl (Ed.5) F24C 15/06	Search Examiner M C MONK Date of completion of Search 8 JUNE 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASE: WPI	Documents considered relevant following a search in respect of Claims :- ALL

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	**P:**	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	**E:**	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	**&:**	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
	None	

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).